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EXAMINER	
WARE, CICELY Q	
ART UNIT	**PAPER NUMBER**
2611	

DATE MAILED: 08/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/865,238	AHMED ET AL.	
	Examiner	Art Unit	
	Cicely Ware	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *10* is/are allowed.

6)☒ Claim(s) *1-9 and 11-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see **REMARKS**, filed 6/13/2006, with respect to the rejection(s) of claim(s) 1 and 19 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Marchok et al. (US Patent 6,285,654).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 1 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art in view of Marchok et al. (US Patent 6,285,654).

(1) With regard to claim 1, Applicant's Admitted Prior Art discloses in (Fig. 2) a communications receiver that comprises: an analog-to-digital converter (26) that samples a DMT (discrete multi-tone) signal to obtain a digital receive signal; a transform module (34) coupled to the analog-to-digital converter and configured to determine amplitudes associated with frequency components of the digital receive signal (Pg. 2, lines 1-8, Pg. 5, lines 19-24).

However Applicant's Admitted Prior Art does not disclose a detection module configured to determine a channel symbol from the amplitudes while accounting for correlation between the amplitudes.

However Marchok et al discloses in (Fig. 8) a detection module (210) configured to determine a channel symbol from the frequency component amplitudes while accounting for correlation between the frequency component amplitudes of the digital receive signal (Fig. 6 (125), col. 3, lines 66-67, col. 4, lines 1-30, col. 7, lines 62-67, col. 8, lines 1-23).

Therefore it would have been obvious to one of ordinary skill in the art to modify Applicant's Admitted Prior Art in view of Marchok et al. to incorporate a detection module configured to determine a channel symbol from the frequency component amplitudes while accounting for correlation between the frequency component amplitudes of the digital receive signal in order for the assigned bandwidth to be used more efficiently by making it capable to transmit more information within the given bandwidth (Marchok et al., col. 1, lines 51-55).

3. Claims 2-4, 5, 6, 7, 9, 11-15, 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art in view of Marchok et al. (US Patent 6,285,654) as applied to claim 1, in further view of Aslanis et al. (US Patent 6,359,933).

(1) With regard to claim 2, claim 2 inherits all the limitations of claim 1. Applicant's Admitted Prior Art in combination with Marchok et al. disclose all the limitations of claim 1.

However Applicant's Admitted Prior Art in combination with Marchok et al. do not disclose wherein the detection module determines the most probable channel symbol given the amplitudes determined by the transform module.

However Aslanis et al. discloses in (Fig. 1) wherein the detection module (60, 68) determines the most probable channel symbol given the amplitudes determined by the transform module (40) (col. 3, lines 28-45, col. 9, lines 35-39).

Therefore it would have been obvious to one of ordinary skill in the art to modify the inventions of Applicant's Admitted Prior Art in combination with Marchok et al. to incorporate wherein the detection module determines the most probable channel symbol given the amplitudes determined by the transform module in order to provide an improved method of frame synchronization in a transmission system using multi-carrier modulation (Aslanis et al., col. 2, lines 38-40).

(2) With regard to claim 3, claim 3 inherits all the limitations of claim 1. Aslanis et al. further discloses in (Fig. 1) a weighted sum unit (60) associated with each frequency component, wherein each weighted sum unit combines a plurality of amplitudes from the transform module (40) in a manner designed to minimize any error between the output of the weighted sum unit and a valid output value (col. 10, lines 62-67- col. 11, lines 1-17).

(3) With regard to claim 4, claim 4 inherits all the limitations of claim 1. Aslanis et al. further discloses the detection module (60) determines the channel symbol that corresponds to a matrix product of a matrix M and a vector of amplitudes from the transform module, wherein the matrix M minimizes a square of an expected error

between the channel symbol and valid channel symbols (col. 8, lines 59-67 – col. 9, lines 1-6).

(4) With regard to claim 5, claim 5 inherits all the limitations of claim 1. Aslanis et al. further discloses in (Fig. 1) a subtraction module (36) that removes trailing intersymbol interference from the output of the transform module (40) to obtain ISI-corrected frequency component values (col. 5, lines 18-33); a decision unit (68) in that determines a matrix product of a matrix M and a vector of ISI-corrected frequency component values to obtain the channel symbol; and a feedback module (70) that determines a matrix product of a matrix T and the channel symbol from the decision unit to provide the trailing intersymbol interference to the subtraction module (col. 10, lines 62-67 – col. 11, lines 1-17).

(5) With regard to claim 6, claim 6 inherits all the limitations of claim 1. Aslanis et al. further discloses in a time domain equalizer that operates on the digital receive signal to maximize a percentage of impulse response energy in a predetermined interval in order to cause an effective increase in the SNR of the reference signal estimate at the receiver (col. 5, lines 17-25).

(6) With regard to claim 7, claim 7 inherits all the limitations of claim 1. Aslanis et al. further discloses a cyclic prefix remover that removes prefixes form the digital receive signal, each prefix being associated with a respective channel symbol (col. 5, lines 21-29)

(7) With regard to claim 9, claim 9 inherits all the limitations of claim 1. Applicant's Admitted Prior Art further discloses in (Fig. 2) the transform module

performs a fast Fourier Transform (FFT) (34) on the receive signal in each channel symbol interval (Pg. 6, lines 20-21, Pg. 11, lines 2-11).

(8) With regard to claim 11, claim 11 inherits all the limitations of claim 1. Applicant's Admitted Prior Art further discloses a method of receiving OFDM modulated data (Pg. 5, lines 19-25).

(9) With regard to claim 12, claim 12 inherits all the limitations of claims 11 and 2.

(10) With regard to claim 13, claim 13 inherits all the limitations of claims 11 and 3.

(11) With regard to claim 14, claim 14 inherits all the limitations of claim 11. Aslanis et al. further discloses wherein said determining a channel symbol includes: determining a product of a matrix and the set of frequency component amplitudes, wherein the matrix includes at least two non-zero values in each row (col. 8, lines 29-58).

Aslanis et al. does not explicitly disclose the matrix includes at least two non-zero values in each row. However it is well known in the art that complex multiplication involves a using a matrix and weights being used for transmission have a non-zero coefficient.

(12) With regard to claim 15, claim 15 inherits all the limitations of claims 11 and 5.

(13) With regard to claim 16, claim 16 inherits all the limitations of claim 11. Applicant's Admitted Prior Art further discloses in (Fig. 2) processing the receive signal

to shorten (26) the effective channel impulse response before performing said determining a set of frequency component amplitudes (34).

(14) With regard to claim 17, claim 17 inherits all the limitations of claims 11 and 7

(15) With regard to claim 18, claim 18 inherits all the limitations of claim 11. Applicant's Admitted Prior Art further discloses in (Fig. 2) determining a set of frequency component amplitudes includes: converting the receive signal into digital form (26); and performing a fast Fourier Transform on the digital receive signal (34).

4. Claims 8, 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art in view of Marchok et al. (US Patent 6,285,654), as applied to claims 1, in further view of Kumar (US Patent 5,748,677).

(1) With regard to claim 8, claim 8 inherits all the limitations of claim 1. Applicant's Admitted Prior Art in combination with Marchok et al. disclose all the limitations of claim 1. However Applicant's Admitted Prior Art in combination with Aslanis et al. do not disclose an error correction code decoder that decodes channel symbols received from the detection module.

Kumar further discloses in an error correction code decoder that decodes channel symbols received from the detection module in order to make the bit error rate of the decoded bit sequence substantially lower that that of the estimated bit sequence (col. 10, lines 44-67 - col. 11, lines 1-5, 15-25).

Therefore it would have been obvious to one of ordinary skill in the art to modify the inventions of Applicant's Admitted Prior Art in combination with Aslanis et al. in view of Kumar to incorporate an error correction code decoder that decodes channel symbols received from the detection module in order to make the bit error rate of the decoded bit sequence substantially lower that that of the estimated bit sequence (Kumar, col. 11, lines 15-25).

(2) With regard to claim 19, claim 19 inherits all the limitations of claim 1. Kumar further discloses in a transmitter that transmits an OFDM modulated signal; and a receiver that receives and demodulates a corrupted version of the OFDM modulated signal (col. 11, lines 32-52).

4. Claims 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art in view of Marchok et al. (US Patent 6,285,654) in view of Kumar (US Patent 5,748,677) as applied to claim 19, in further view of Aslanis et al. (US Patent 6,359,933).

(1) With regard to claim 20, claim 20 inherits all the limitations of claim 19. Applicant's Admitted Prior Art in combination with Marchok et al. in combination with Kumar disclose all the limitations of claim 19.

However Applicant's Admitted Prior Art in combination with Marchok et al. in combination with Kumar do not disclose wherein the detection module determines the most probable channel symbol given the amplitudes determined by the transform module.

However Aslanis et al. discloses in (Fig. 1) wherein the detection module (60, 68) determines the most probable channel symbol given the amplitudes determined by the transform module (40) (col. 3, lines 28-45, col. 9, lines 35-39).

Therefore it would have been obvious to one of ordinary skill in the art to modify the inventions of Applicant's Admitted Prior Art in combination with Marchok et al. in combination with Kumar in view of Aslanis et al. to incorporate wherein the detection module determines the most probable channel symbol given the amplitudes determined by the transform module in order to provide an improved method of frame synchronization in a transmission system using multi-carrier modulation (Aslanis et al., col. 2, lines 38-40).

(2) With regard to claim 21, claim 21 inherits all the limitations of claim 19. Aslanis et al. further discloses in (Fig. 1) a weighted sum unit (60) associated with each frequency component, wherein each weighted sum unit combines a plurality of amplitudes from the transform module (40) in a manner designed to minimize any error between the output of the weighted sum unit and a valid output value (col. 10, lines 62-67- col. 11, lines 1-17).

(3) With regard to claim 22, claim 22 inherits all the limitations of claim 19. Aslanis et al. further discloses the detection module (60) determines the channel symbol that corresponds to a matrix product of a matrix M and a vector of amplitudes from the transform module, wherein the matrix M minimizes a square of an expected error between the channel symbol and valid channel symbols (col. 8, lines 59-67 – col. 9, lines 1-6).

(4) With regard to claim 23, claim 23 inherits all the limitations of claim 19. Aslanis et al. further discloses in (Fig. 1) a subtraction module (36) that removes trailing intersymbol interference from the output of the transform module (40) to obtain ISI-corrected frequency component values (col. 5, lines 18-33); a decision unit (68) in that determines a matrix product of a matrix M and a vector of ISI-corrected frequency component values to obtain the channel symbol; and a feedback module (70) that determines a matrix product of a matrix T and the channel symbol from the decision unit to provide the trailing intersymbol interference to the subtraction module (col. 10, lines 62-67 – col. 11, lines 1-17).

Allowable Subject Matter

5. Claim 10 is allowed.

6. The following is a statement of reasons for the indication of allowable subject matter: The instant application discloses a communications receiver. Prior art references show similar methods but fail to teach: **"wherein the transform module includes a bank of matched bandpass filters"**, as in claim 10.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cicely Ware whose telephone number is 571-272-3047. The examiner can normally be reached on Monday – Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Cicely Ware

cqw
August 10, 2006

KHAI TRAN
PRIMARY EXAMINER